#9 정적분 계산

(1) $\int_{-\pi}^{\pi} (x + \sin x \cos x)\, dx$

$= \int_{-\pi}^{\pi} x\, dx + \int_{-\pi}^{\pi} \sin x \cos x\, dx$

$\sin x = t \quad \cos x = \frac{dt}{dx} \quad dx = \frac{dt}{\cos x}$

$x = \pi \Rightarrow t = \sin \pi = 0$

$x = -\pi \Rightarrow t = \sin(-\pi) = -\sin \pi = 0$

$\int_{-\pi}^{\pi} x\, dx + \int_{0}^{0} t\, dt = \int_{-\pi}^{\pi} x\, dx$

$= \left[\frac{1}{2}x^2\right]_{-\pi}^{\pi} = \frac{1}{2}\pi^2 - \frac{1}{2}\pi^2 = 0$

(2) $\int_{-\pi}^{\pi} x \cos 5x\, dx$

$= \left[\frac{1}{5}x \sin 5x\right]_{-\pi}^{\pi} - \int_{-\pi}^{\pi} \frac{1}{5}\sin 5x\, dx$ (이 부분 $= 0$)

$= -\frac{1}{5}\int_{-\pi}^{\pi} \sin 5x\, dx = -\frac{1}{5}\left[-\frac{1}{5}\cos 5x\right]_{-\pi}^{\pi}$

$= -\frac{1}{25} - \left(-\frac{1}{25}\right) = 0$